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Patents

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): **GAYLORD DARRELL SMITH**
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Serial No.: Gr. Art Unit:

Filed:

For: **ADVANCED HIGH TEMPERATURE CORROSION RESISTANT ALLOY**

Examiner:

INFORMATION DISCLOSURE STATEMENT & FORM PTO-1449

Assistant Commissioner for Patents
Washington, DC 20231

S i r:

In accordance with of 37 C.F.R. § 1.97, Form PTO-1449 attached contains a listing of references believed to be material to the examination of this patent application.

Please note that copending application U.S. Ser. No. 09/100,605, filed June 19, 1998, reads as follows:

1. A nickel-base alloy consisting essentially of, by weight percent, about 10 to 24 cobalt, about 22.6 to 30 chromium, about 2.4 to 6 molybdenum, about 0 to 9 iron, about 0.2 to 3.2 aluminum, about 0.2 to 2.8 titanium, about 0.1 to 2.5 niobium, about 0 to 2 manganese, about 0 to 1 silicon, about 0.01 to 0.3 zirconium, about 0.001 to 0.01 boron, about 0.005 to 0.3 carbon, about 0 to 4 tungsten, about 0 to 1 tantalum and balance nickel and incidental impurities, the alloy being further characterized by satisfying:

1) $\%Cr + 0.6 \times \%Ti + 0.5\% \times \%Al + 0.3 \times \%Nb \geq 24\%$;

2) $\%(Cr + 0.8\% \times Mo) + 0.6 \times \%Ti + 0.5 \times \%Al + 0.3 \times \%Nb \leq 37.5\%$;

3) $\%Al + 0.56 \times \%Ti + 0.29x \%Nb \geq 1.7\%$; and

4) $\%Al + 0.56 \times \%Ti + 0.29 \times \%Nb \leq 3.4\%$.

Smith et al., in U.S. Pat. No. 3,151,981, discloses 10 to 20 cobalt, 14 to 22 chromium, 3 to 10 molybdenum, 0 to 25 iron, 0 to 0.8 aluminum, 2 to 3.5 titanium, 2 to 5.25 niobium, 0.07 manganese, less than 0.2 silicon, 0.01 to 0.1 zirconium, 0.001 to 0.1 boron, 0.03 to 0.09 carbon and balance nickel.

Richards et al., in U.S. Pat. No. 3,479,157, disclose 0 to 45 cobalt, 0 to 35 chromium, 0 to 10 molybdenum, 0 to 80 iron, 0 to 8 aluminum, 0 to 8 titanium, 0 to 10 niobium, 0 to 10 manganese, 0 to 8 silicon, 0 to 0.3 zirconium, 0.001 to 0.01 boron, 0 to 1.5 carbon and balance nickel.

Shaw et al., in U.S. Pat. No. 3,681,059, disclose 8 to 20 cobalt, 24 to 27 chromium, 4 to 7 molybdenum, 0 to 5 iron, 0 to 1 aluminum, 0 to 1 titanium, 1.5 to 2.5 niobium, 0 to 1 zirconium 0 to 0.1 boron, 0.4 to 0.8 carbon and balance nickel.

Richards et al., in U.S. Pat. No. 3,723,107, disclose 10 to 24 cobalt, 19.5 to 23 chromium, 0 to 4.5 molybdenum, 0 to 2 iron, 0.7 to 3.5 aluminum, 1.9 to 3.5 titanium, 0.5 to 3 niobium, 0 to 1 manganese, 0 to 1 silicon, less than 0.05 zirconium, 0.001 to 0.05 boron, 0.01 to 0.2 carbon and balance nickel.

Twigg et al., in U.S. Pat. No. 3,723,108, 10 to 24 cobalt, 23.5 to 26 chromium, 0.5 to 2.2 molybdenum, 0.85 to 2.8 aluminum, 2.1 to 2.8 titanium, 0.25 to 2.5 niobium, 0 to 1 manganese, 0 to 1 silicon 0 to 0.15 zirconium, 0.001 to 0.05 boron, 0.01 to 0.2 carbon and balance nickel.

Eiselstein et al., in U.S. Pat. No. 3,859,060, disclose 9.5 to 20 cobalt, 20 to 24 chromium, 7 to 12 molybdenum, 0.8 to 1.5 aluminum, 0 to 0.6 titanium, 0 to 4 niobium, 0.41 silicon, 0 to 0.1 zirconium, 0 to 0.06 boron, 0 to 0.15 carbon and balance nickel.

Shaw, in U.S. Pat. No. 4,039,330, discloses 5 to 25 cobalt, 21 to 24 cobalt, 0 to 3.5 molybdenum, 1 to 4 aluminum, 1.7 to 5 titanium, 0.3 to 2 niobium, 0.005 to 1 zirconium, 0.001 to 0.05 boron, 0.02 to 0.25 carbon and balance nickel.

Susukida et al., in U.S. Pat. No. 4,474,733, disclose 4.7 to 9.4 cobalt, 20 to 26 chromium, 5 to 16 molybdenum, 0.6 to 1.5 aluminum, 0.1 to 1 titanium, 0.1 to 1 niobium, 0.001 to 0.3 zirconium, 0.001 to 0.15 carbon and balance nickel.

Yabuki et al., in U.S. Pat. No. 4,727,740, disclose 1 to 8 cobalt, 10 to 28 chromium, 0.1 to 10 molybdenum, 0.1 to 30 iron, 0.1 to 4.5 aluminum, 0.01 to 4.5 titanium, 0.1 to 3 manganese, 0.1 to 3 silicon, 0.001 to 0.2 zirconium, 0.001 to 0.2 boron, 0.55 to 2.0 carbon and balance nickel.

Wood et al., in U.S. Pat. No. 4,810,467, disclose 10 to 25 cobalt, 20 to 28 chromium, 0.5 to 1.5 aluminum, 1.5 to 2.8 titanium, 0.5 to 1.5 niobium, less than 0.05 zirconium, 0.001 to 0.05 boron, 0.02 to 0.15 carbon and balance nickel.

Chang, in U.S. Pat. No. 4,981,644, discloses 5 to 20 cobalt, 12 to 24 chromium, 1 to 8.5 molybdenum, 0 to 1 iron, 0 to 2.7 aluminum, 0 to 3.7 titanium, 0 to 10.5 niobium, 0 to 0.5 manganese, 0 to 0.5 silicon, 0 to 0.1 zirconium, 0.003 to 0.05 boron, 0 to 0.1 carbon and balance nickel.

Doi et al., in U.S. Pat. No. 5,370,497, disclose 15 to 25 cobalt, 15 to 25 chromium, 0 to 5 molybdenum, 1 to 3 aluminum, 1 to 3 titanium, 1 to 3 niobium, 0 to 2 manganese, 0 to 2 silicon, less than 0.05 zirconium, 0.001 to 0.03 boron, 0.05 to 0.20 carbon and balance nickel.

Ganesan et al., in U.S. Pat. No. 5,372,662, discloses 10 to 15 cobalt, 18 to 25 chromium, 5 to 9 molybdenum, 0 to 8 iron, 0.7 to 1.5 aluminum, 0 to 0.5 titanium, 0 to 1 manganese, 0.05 to 0.75 silicon, 0.01 to 0.05 zirconium, 0 to 0.05 boron, 0.04 to 0.15 carbon and balance nickel.

Frank et al., in U.S. Pat. No. 5,556,594, discloses 0 to 5 cobalt, 16 to 24 chromium, 7 to 12 molybdenum, 0 to 20 iron, 0 to 1 aluminum, 0.5 to 2.5 titanium, 2 to 6 niobium, 0 to 5 manganese, 0 to 1 silicon, less than 0.5 zirconium, less than 0.02 boron and less than 0.1 carbon.

U.K. Pat. No. 880,805 discloses 12 to 25 cobalt, 19 to 23 chromium, 4.7 to 8.6 molybdenum, 0 to 1 iron, 0.3 to 0.7 aluminum, 1.7 to 2.45 titanium, 0.2 to 0.6 manganese, 0.1 to 0.5 silicon, 0.01 to 0.005 zirconium, 0.04 carbon and balance nickel.

Japan Pat. Pub. No. 61-147838 discloses 30 to 55 nickel, 20 to 30 chromium, 0.5 to 6 molybdenum, 0.6 to 3 aluminum, 0.6 to 3 titanium, 1 to 6 niobium, less than 10 manganese, less

than 1 silicon, 0.005 to 0.2 zirconium, 0.001 to 0.01 boron, less than .07 carbon, 30 to 55 nickel and balance iron.

Nimonic® alloy 263 consists of 0.04 to 0.08 carbon, 0.4 max. silicon, 0.6 max. manganese, 0.6 max. aluminum, 0.005 max. boron, 19 to 21 cobalt, 0.7 max. iron, 5.6 to 6.1 molybdenum, 1.9 to 2.4 titanium, 2.4 to 2.8 total aluminum and titanium, and balance nickel.

Although the USPTO has been provided with copies of the above-referenced material, it should be understood that there may be additional material which is either unknown to or unappreciated by the undersigned.

Respectfully submitted,

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DATE

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